EXHIBIT A: EXECUTIVE SUMMARY

COMMONWEALTH OF VIRGINIA

ExhibitAExecutiveSummary.pdf

EXHIBIT A: EXECUTIVE SUMMARY.

The Commonwealth of Virginia has embraced the opportunity to apply to the US Housing and Urban Development's (HUD) National Disaster Resiliency Competition (NDRC). Virginia seeks to: (1) address unmet recovery needs in the most impacted and distressed areas of its Hampton Roads region, which suffered damage from the qualifying disaster, Hurricane Irene, in 2011, and (2) facilitate the longer-term resilience of the region in response to extreme weather events, recurrent flooding, and sea level rise .

Innovation is found in Virginia's holistic regional resiliency approach that extends beyond infrastructure to encompass community and economic development. That is, the development of infrastructure and water management approaches will be informed by, and work in concert with, enhancing the health and wellbeing of citizens and stimulating economic growth. We will be building resilience in our population and leverage these changes as an economic accelerator. This innovative living with water approach, called "**THRIVE: Resilience In Virginia**," is concurrent with the HUD's National Objective to directly benefit low- and moderate-income persons and households by focusing on unmet recovery needs, as well as build regional resilience capacity to manage extreme weather events and adapt to sea level rise .

THRIVE: Resilience In Virginia has five major goals: (i) Unite the Region, (ii) Create Coastal Resilience, (iii) Build Water Management Solutions, (iv) Improve Economic Vitality, and (v) Strengthen Vulnerable Neighborhoods. This comprehensive approach capitalizes on the region's strengths and converts risks and vulnerabilities into opportunities: Hampton Roads will reduce risk to its most vulnerable communities and thrive with water by developing a model maritime region that derives its economic vitality from its position on the water.

Together, the Hampton Roads and Eastern Shore regions include the cities of Norfolk, Virginia Beach, Chesapeake, Newport News, Hampton, Portsmouth, Suffolk, Poquoson, Williamsburg and the counties of Accomack and Northampton, with a population over 1.7 million. Following Hurricane Irene,

all of these localities were declared by the President to be major disaster areas. Recurrent flooding, threat of catastrophic loss, and risk to our citizens is forecast to increase in response to sea level rise , which is exacerbated by land subsidence: Hampton Roads has the highest rate of relative sea level rise along the U.S. East Coast. Old Dominion University research shows that while global sea levels have risen 5-8 inches in the last century, sea level has risen over 14 inches in Hampton Roads since 1930 (Atkinson, Ezer, and Smith, 2013). As a result, among US population centers at risk from rising water, Hampton Roads is second only to New Orleans; increasing the region's resiliency is critical.

Further, the region includes Naval Station Norfolk, the world's largest military base (with a plant replacement value of over $4.2 billion), as well as other major Navy, Air Force, Army, Marine Corps, and Coast Guard installations, and Federal facilities such as NASA Langley. Almost a quarter of US active-duty military personnel are stationed in Hampton Roads, and 31% of US naval shipbuilding and repair capacity is housed there. The region also is home to the Port of Virginia, the only East Coast port with shipping channels deep enough to accommodate the new Post-Panamax ships. These assets position the region as a global leader in security and trade.

Governor Terry McAuliffe has selected the Commonwealth's Department of Housing and Community Development (DCHD) to coordinate development of its NDRC application. DCHD encompasses a wide range of services and frequently collaborates across disciplines to serve vulnerable populations. The agency has partnered with state, regional and local government, academia, business and nonprofit entities to design an approach that will cultivate resilience. Under the leadership of DHCD, the Commonwealth, its qualifying localities and stakeholders have collaborated to create such an approach to resilience.

EXHIBIT B: THRESHOLD REQUIREMENTS

COMMONWEALTH OF VIRGINIA

ExhibitBThresholdRequirements.pdf

EXHIBIT B: THRESHOLD REQUIREMENTS.

Virginia presents the "Most Impacted and Distressed" threshold data for the Cities of Norfolk and Chesapeake accepted by HUD's 45-day threshold review letter and the corrected "Unmet Recovery Needs" threshold data with addressed deficiencies.

CITY OF NORFOLK - MOST IMPACTED AND DISTRESSED THRESHOLD. The target area identified as most impacted and distressed is identified census tracts in **Norfolk, Virginia** as a result of **Hurricane Irene** that occurred in 2011. The area is a sub-county area within a county declared as a Qualified Disaster.

Target Area. Norfolk, VA census tracts1, 2.01, 2.02, 3, 4, 5, 6, 7, 8, 9.01, 9.02, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35.01, 36, 37, 38, 40.01, 40.02, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 55, 56.01, 56.02, 57.01, 57.02, 58, 59.01, 59.02, 59.03, 60, 61, 62, 64, 65.01, 65.02, 66.01, 66.02, 66.03, 66.04, 69.01, 69.02, 70.01, 70.02, 9801, 9802. (see MID-URNTargetNorfolk.pdf).

Most Impacted Characteristics. As a result of Hurricane Irene in 2011, 345 homes in the contiguous sub-county target area sustained damage – 187 dwellings affected, 2 residential dwellings destroyed, 28 residential dwellings sustained major damage, and 128 residential dwellings sustained minor damage, as recorded by the City's damage assessment team during windshield survey in the aftermath of the Qualified Disaster, using FEMA's Individual Assistance Damage Assessment Level Guideline (see 1DatasetMINorfolk.xlsx).

Most Distressed Characteristics. More than 50% of people in the target area earn less than 80% of the area median income. The population of the target area is 206,675. Of that 112,415 individuals, or 54.39%, are low- and moderate-income, as indicated by the CDBG low- and moderate-income summary data. Dataset 2 provides a detailed breakdown of the LMI population (2DatasetDistressNorfolk.xlsx).

Unmet Recovery Needs Threshold. The City of Norfolk has Unmet Recovery Needs, meaning needs that have not been addressed by federal, state, or other sources, in the target area identified in this application as "Most Impacted and Distressed."

The Commonwealth of Virginia has calculated the unmet needs under the Most Impacted Characteristics of Housing using the following NOFA definition found in Section III (b)(ii) of Appendix G of the NOFA: *A methodologically sound "windshield" survey of the target area conducted since January 2014. A list of 20 addresses needs to be provided to HUD of units identified with remaining damage. A survey of at least 9 of these addresses confirming (i.) the damage is due to the disaster and (ii.) they have inadequate resources from insurance/FEMA/SBA for completing their repairs.*

<u>93 houses with remaining damage – resilience repair</u>

- Of 345 homes in the Most Impacted and Distressed sub-county target area that sustained damage from Qualified Disaster, Hurricane Irene, 196 lie within FEMA designated floodplain.
- Windshield survey conducted on 93 of these houses in March 2015 demonstrates that these houses have remaining damage as repairs to these homes did not incorporate resilient measures, such as house elevation, to mitigate similar future damage (see photos: WindshieldSurveyNorfolk *[Dropbox folder]*; see also 3DatasetUnmetNorfolk.xlsx). Ten (10) surveyed home owners confirmed that (i.) the damage was due to the disaster and (ii.) they had inadequate resources from insurance/FEMA/SBA to complete resilient repairs such as elevating the structure (see 10ResSurveysNorfolk.pdf).
- Effective January 1, 2014, Norfolk changed requirements for new construction for structures located in the floodplain to be built with freeboard at three (3) feet above the 100 year flood estimated flooding levels. The previous level had been one (1) foot above the 100 year flood estimated flooding levels. Additionally, in the 0.2% annual chance flood zone, all new construction shall have the lowest floor, including basement, elevated or flood-proofed to one and one-half (1.5) feet above the highest grade immediately adjacent to the structure.
- Appendix G: Section III A(a) states that total repair costs can include the reasonable extra cost to buyout homes or repair homes resiliently, e.g., extra cost to elevate or build a safe room. Based on

their location in the FEMA defined floodplain and the city's commitment to ensuring that structures are elevated, resilient repair would include house elevation.

- Therefore, unmet needs include the cost of elevating 93 houses at an average cost of $150,000 per house.
- As noted above, the Unmet Need is the documented instances of homes to be elevated out of the repetitive flooding zones. The City has worked with residents on an individual basis where possible to undertake this action; however, there are insufficient resources to complete this much needed activity.

CITY OF CHESAPEAKE - MOST IMPACTED AND DISTRESSED THRESHOLD. The target area identified as most impacted and distressed is identified census tracts in **Chesapeake, Virginia** as a result of **Hurricane Irene** that occurred in 2011. The area is a sub-county area within a county declared a Qualified Disaster.

Target Area. Chesapeake, Virginia census tracts 214.03, 200.02, 200.03, 201, 202, 203, 204, 205, 206, 207, 209.03, 209.04 (see MID-URNTargetChes.pdf). This target area exhibits Most Impacted Characteristics and Most Distressed Characteristics which affect the ability of the area to recover from Hurricane Irene.

Most Impacted Characteristics. Chesapeake, Virginia meets the Housing Most Impacted Characteristics as defined in Appendix G of the NOFA as follows: *A concentration of housing damage in a sub-county area due to the eligible disaster causing damage to either a minimum of 100 homes or serious damage to a minimum of 20 homes*.

As a result of Hurricane Irene in 2011, 335 residential properties sustained damage. 166 of these damaged houses are concentrated in the contiguous sub-county Target Area – 82 residential dwellings affected, 21 residential dwellings sustained major damage, and 63 residential dwellings sustained minor damage as recorded by the City's damage assessment team during windshield survey in the aftermath of the Qualified Disaster, using FEMA's Individual Assistance Damage Assessment Level Guideline (see 4DatasetMIChes.xlsx).

Most Distressed Characteristics. More than 50% of people in the target area earn less than 80% of the area median income. The population of the target area is 50,025. Of that 25,940 individuals, or 51.85%, are low- and moderate-income (LMI), as indicated by CDBG low- and moderate-income summary data. Dataset 5 provides a detailed breakdown of the LMI population (see 5DatasetDistressChes.xlsx).

Unmet Recovery Needs Threshold. The City of Chesapeake has Unmet Recovery Needs, meaning needs that have not been addressed by Federal, state, or other sources, in the area(s) identified in this letter as "most impacted and distressed."

The Commonwealth of Virginia has calculated the unmet needs under the Most Impacted Characteristics of Housing using the NOFA definition found in Section III (b)(ii) of Appendix G of the NOFA noted above.

<u>59 houses with remaining damage – resilience repair</u>

- Windshield survey conducted in January 2015 demonstrates that 59 homes in the target area have remaining damage from the Qualified Disaster as repairs to these homes did not incorporate resilient measures, such as house elevation, to mitigate similar future damage (see photos: WindshieldSurveyChes *[Dropbox folder]*;; see also 6DatasetUnmetChes.xlsx). All of these houses lie within FEMA designated floodplain. Ten (10) surveyed residents confirmed that (i.) the damage was due to the disaster and (ii.) they had inadequate resources from insurance/FEMA/SBA for completing their repairs (see 10ResSurveysChes.pdf).
- Twenty-five (25) of the 59 houses have had multiple flood insurance claims according to historic flood claims data.
- Effective July, 2013, Chesapeake changed requirements for new construction for structures located in the floodplain to be built with freeboard at one and half (1.5) feet above the 100 year flood estimated flooding levels. The previous level had been one (1) foot above the 100 year flood estimated flooding levels.

- Appendix G: Section III A(a) states that total repair costs can include the reasonable extra cost to buyout homes or repair homes resiliently, e.g., extra cost to elevate or build a safe room. Based on their location in the FEMA defined floodplain and the city's commitment to ensuring that structures are elevated, resilient repair would include house elevation.
- Therefore, unmet needs include the cost of elevating 59 houses at an average cost of $150,000 per house.

National Objective. The Hampton Roads target areas in the Cities of Chesapeake and Norfolk, Virginia described above represent households with up to 80% of the area's median income, and thus the target areas qualify as meeting the low- and moderate-income person benefit national objective.

Overall Benefit. The Commonwealth of Virginia will ensure that at least 50 percent of the funds requested for programs and activities developed in the Phase II application will benefit low- and moderate-income persons in the form of services, area benefit, housing, and/or jobs.

Tie-back. Virginia's Phase II application for CDBG-NDR grant funding will document how its proposed programs and activities respond to its Qualifying Disaster, Hurricane Irene (2011).

However, both the Commonwealth and the Hampton Roads region are committed to applying the overall approach articulated for **THRIVE: Resiliency In Virginia** in this proposal. Virginia will seek funding support from additional sources in order to develop and implement a comprehensive plan to increase resiliency across the region.

EXHIBIT C: CAPACITY

COMMONWEALTH OF VIRGINIA

ExhibitCCapacity.pdf

EXHIBIT C: CAPACITY

A. GENERAL MANAGEMENT CAPACITY. The Governor of the Commonwealth of Virginia, Terry McAuliffe, has appointed the Virginia Department of Housing and Community Development (DHCD) as the lead agency for the Commonwealth's application to the National Disaster Resilience Competition (NDRC). DHCD has significant project experience and also been designated to serve as the grant administrator and project implementation manager for any grant funds awarded through the NDRC. As the primary point of contact for all programmatic and contractual obligations, DHCD will be responsible for overall oversight, fiscal and budgetary controls and inter-community coordination.

DHCD oversees the investment of more than $100 million each year into housing and community development projects throughout the Virginia, most of which serve low-to-moderate income citizens. DHCD works regularly with issues including resilience, storm disaster management, public works, affordable housing, environmental quality, economic revitalization, building and fire code management, and has extensive knowledge of fair housing, civil rights, fair labor standards, environmental review process, and other program-related federal requirements.

Capacity to Launch and Manage Major Projects. DHCD implements comprehensive community revitalization strategies throughout the Commonwealth, and has experience with leading major projects, including some that have been cited as models. DHCD's implementation of the HUD Neighborhood Stabilization Program (NSP), a high profile program developed to help communities stabilize neighborhoods impacted by foreclosure and abandonment, illustrates the agency's ability to effectively implement a highly leveraged, time-sensitive priority program. Virginia's highly successful NSPs acquired, rehabilitated, and resold over 300 homes, generating close to $50 million in program income that was reinvested to support the continuation of the program.

Experience with Collaboration and Coordination for Large Projects. To accomplish its mission of creating safe, affordable, and prosperous communities where citizens can live, work and do business in

Virginia, DHCD must routinely collaborate with a wide range of groups, including other state agencies, municipalities, special interest groups, nonprofits, foundations, the business community, and local outreach organizations. For the Virginia NSP program, DHCD coordinated the efforts of 25 municipal governments and nonprofits assisting communities hardest hit by the foreclosure crisis, turning foreclosed properties back to productive housing units. The program was efficiently managed through proven strategies, such as providing on-line and on-site training and workshops, policy briefs, technical assistance for outreach marketing and a variety of financial resources, including a frequently-asked-questions database, standardized forms, brochures, standardized sample transaction processes, and reporting mechanisms.

DCHD's coordinated approach to the Continuum of Care system transformed Virginia's homeless services system into a national model: in 2014, Virginia saw decreases of 7.9% in overall homelessness, 10.8% in family homelessness, and 14% decrease in veteran homelessness. This was accomplished mostly through effective coordination and realignment of existing resources to the Housing First Model.

Application Development. This Phase I funding application was developed and written by a team led by the Deputy Director of the DHCD, in collaboration with local government staff from the Cities of Norfolk and Chesapeake, and with the support of staff from the Old Dominion University (ODU) Office of Research. It also reflects the input of regional stakeholders, many of whom are now partners, who participated in identifying needs and contributed to the approach described in Exhibit E.

B. CROSS DISCIPLINARY TECHNICAL CAPACITY. The complexity of Virginia's water management issues requires a comprehensive multidisciplinary team approach to resiliency. The Commonwealth has assembled a robust team comprised of 44 partners, including state agencies, local governments, regional organizations, academia, private companies, and nonprofit organizations. Virginia’s multi-pronged, multi-disciplinary approach to building resiliency necessitates a wide range of partners that can provide different kinds of expertise (see *Table 1.* Virginia’s Key Partners and Primary Technical Capacities).

Partner Capacity. Led by DHCD, government partners at the state and local levels will contribute strategic planning, program management, administrative and oversight capacity, as well as operational capacity with respect to water management, disaster response, public works, affordable housing, environmental quality, economic revitalization, and resilience. Nonprofit partners contribute essential capacity, noted below, to strengthen resident's resilience through increased choices in housing, training for new job opportunities and the coordination of neighborhood-level social support networks. Private sector partners provide knowledge of maritime operations, and encourage innovation, promote entrepreneurship, mentor new businesses, implement workforce development and foster economic development. Finally, academic partners contribute research and scientific expertise in climate change data analysis, assessment of risk and critical infrastructure vulnerability. They will also help ensure projects selected for Phase II are cutting-edge solutions that incorporate excellence in resilient design.

Table 1. **Virginia's Key Partners and Primary Technical Capacities**

TYPE	THRIVE PARTNERS	PRIMARY TECHNICAL CAPACITY
GOVERNMENT	VA DHCD (lead agency)	Affordable Housing, Comprehensive Planning, Economic Development
	City of Chesapeake	Public works, Floodplain/Emergency Mgmt., Planning,
	City of Norfolk	Public works, Floodplain/Emergency Mgmt., Planning
	Norfolk Redevelopment & Housing Authority	Real estate development, housing, poverty mitigation
	Virginia Dept. of Emergency Management	Emergency Management, State Mitigation Plan

TYPE	THRIVE PARTNERS	PRIMARY TECHNICAL CAPACITY
GOVERNMENT	Virginia Dept. of Environmental Quality	Environment
	Virginia Dept. of General Services	Engineering and Architecture, Procurement
	Virginia Dept. of Health	Health, Emergency Preparedness
	Virginia Dept. of Military Affairs	Military Affairs, Virginia National Guard
	Virginia Dept. of Planning and Budget	Fiscal, Legislative, Regulatory Policies, Allocation of Public Resources (Budget)
	Virginia Port Authority/The Port of Virginia	Economic Development
	Accomack-North Planning District Commission	Planning, Housing, Infrastructure
	Hampton Roads Planning District Commission/ HRTPO	Data Analysis, Comprehensive Planning, Transportation, Water Resources
ACADEMIA	The College of William & Mary	Resilience Research, Education
	Eastern Virginia Medical School	Health Impacts
	George Mason University	Disaster Resiliency
	Hampton University Architecture	Architectural Design, Water Mgmt. Solutions
	Old Dominion University	Climate Change Data Analysis, Risk Assessment, Proposal Support
	Strome Entrepreneurial Center and Gaming Hub	Entrepreneurship, Economic Development
	Virginia's Community Colleges	Education, Workforce Development
	Virginia Institute of Marine Sciences	Marine Science, Research, Education, Policy

TYPE	THRIVE PARTNERS	PRIMARY TECHNICAL CAPACITY
PRIVATE SECTOR	ARCADIS Engineering	Water Mgmt. Design, Engineering, Cost-Benefit Analysis
	Concursive Corporation	Digital Ecosystems, Hyper-Local Social Cohesion Building
	Cox Communications, Inc.	Communications
	Newport News Shipbuilding	Economic Development
	Resilient Corporation	Resilience Metrics
	Timmons Group	Green Infrastructure, Stormwater Mgmt., Cost-Benefit Analysis
	Towne Bank	Realty, Insurance
	Work Program Architects	Architecture
NON-PROFITS	Access Partnership	Health Care
	Elizabeth River Project	Environmental Quality
	Garden Club of Norfolk	Green Restoration, Water Management
	Hampton Roads Center for Civic Engagement	Community Engagement
	Hampton Roads Chamber of Commerce	Economic Revitalization
	Hampton Roads Community Foundation	Philanthropic Services
	Hampton Roads Workforce Development Board (Opportunity, Inc.)	Workforce Development

TYPE	THRIVE PARTNERS	PRIMARY TECHNICAL CAPACITY
NON-PROFITS	Lafayette Wetlands Project	Community Engagement, Environmental Quality
	Resilient Virginia	Community Engagement, Planning
	Science Museum of Virginia	K-12 STEM Education Green
	Sentara Healthcare	Health Care
	The Planning Council	Human Services, Vulnerable Populations
	The Up Center	Affordable Housing
	Urban Land Institute-Hampton Roads	Resilient Land Use Design
	Wetlands Watch	Green Infrastructure, Environmental Quality

Cross Disciplinary Capacity. DHCD performs cross-disciplinary work regularly, as part of the agency responsibility to manage state CDBG funds, federal and state housing programs, disaster recovery assignments, and other major federal and state programs. The agency's large affordable housing and neighborhood enhancement projects entail coordination of multiple public and private sector functions, teams, and disciplines, including planning, design, engineering, environmental, and socio-economic approaches. DHCD also manages the Commonwealth's storm disaster management, public works, environmental quality, building and fire code regulation, and economic revitalization projects, all within a framework of federal and state standards which regulate fair housing, civil rights, environmental review processes, labor standards, and others.

An example of DHCD's cross-disciplinary implementation is Building Collaborative Communities, an innovative program that coordinates resources from a number of state entities to stimulate job creation, economic development and build community capacity and leadership in economically distressed areas.

This program brings together multiple state agencies, private sector partners, educational institutions, community groups, and residents, in a participatory process.

Area-wide Comprehensive Planning and Implementation of Complex Projects. Virginia's state, regional and local government agencies, and selected nonprofit and private sector partners have extensive experience with collaborative regional planning and complex project implementation. For example, the Virginia Department of Emergency Management (VDEM) is currently involved in regional planning and execution of projects to repair or replace damaged public infrastructure, including roads and bridges, water control facilities, parks, and recreational facilities at eight Commonwealth disaster sites. In addition, the Hampton Roads Planning District Commission (HRPDC), which offers comprehensive planning services to its members throughout Hampton Roads, and is currently working on a process to streamline and consolidate regional emergency management planning activities.

Virginia nonprofits and private companies are also coordinating comprehensive approaches to regional challenges. The Hampton Roads Community Foundation, in cooperation with regional municipalities, is currently implementing a region-wide economic revitalization project, and a private sector partner, Timmons Group, has conducted area-wide wetland restoration projects and modeled citywide storm water watersheds in several Virginia localities, including Hampton Roads. Virginia also harnesses the strengths of its universities: Old Dominion University (ODU) in Norfolk has joined with the Green Infrastructure Center and the City of Norfolk to carry out eight complex, multi-dimensional shoreline restoration and resiliency projects, including a green infrastructure job training and youth engagement component.

While the military installations in Hampton Roads are not partners for this project, the Cities of Norfolk and Chesapeake have shared this vision for a regional migration approach with them and received enthusiastic responses at the highest local levels. Coordinating mitigation efforts with the military is

critical, both to avoid duplication of effort and to ensure the base commands are aware of any mitigation projects (for example, transportation-related projects) which could positively impact their operations.

Capacity to Assess Relevant Scientific Information on Climate Change and Resiliency. Multiple partners to this proposal, including VDEM, ODU, Virginia Institute of Marine Science (VIMS), Wetlands Watch, HRPDC, and the Timmons Group, as well as various federal entities, including the US Army Corps of Engineers and the US Navy, have the capability to analyze climate change resilience data. Over 40 relevant studies have been conducted in the last ten years, helping to identify needs and options for mitigating the potential impacts of coastal flooding and sea level rise. In addition to the expertise available through scientists and consultants who are **THRIVE** partners, several partners are actively engaged in related research.

At ODU, research is underway to model and forecast the temporary, interim and permanent housing needs of medically fragile and vulnerable populations in Hampton Roads stemming from severe weather events. This study will allow "what if" testing of local pre-disaster plans and will inform housing recovery planning practices and policies. A second relevant study taking place is examining individual level adaption strategies within the context of the household unit. This research will inform resiliency planning by providing local governments with information on residents' perceptions of risk, sea level rise, recurrent flooding, and adaption awareness, as well as the actual capacity of households for adaption.

Experience with Civil Rights and Fair Housing Issues. DHCD understands and adheres to Fair Housing requirements and Title VI of the Civil Rights Act of 1968. As part of contractual agreements with DHCD, all sub-grantees will be required to meet all requirements of the Act and will be monitored for compliance by DHCD.

Capacity for Design Quality that Enhances Resiliency. Virginia is committed to incorporating resilient design into projects and thus creating concurrent benefits to urban landscapes. As specific plans for implementation through Phase II are developed, DHCD and regional stakeholders will integrate

innovative features that provide co-benefits. Project partners with expertise in architecture and landscape architecture and innovative water management, including ARCADIS which participated in "Rebuild By Design," will provide the necessary knowledge, skill and creativity to accomplish this.

Virginia's approach to resilient design in project planning and implementation will also be informed by the Chief Resilience Officers for both the Commonwealth and the City of Norfolk, and by the 100 Resilient Cities Initiative currently underway in Norfolk. Virginia is the first state to appoint a Chief Resilience Officer, and the City of Norfolk was the third city in the world to appoint a Chief Resilience Officer. With resilience as the guiding tenet, projects will employ quality design, producing co-benefits to the urban landscape that could also save energy, enhance quality of life, or improve social outcomes in addition to addressing the threats of sea level rise and flooding.

Plan to Regain Capacity. Virginia's approach to assuring capacity for its NDRC projects relies on a rich partner network that incorporates redundancy. By identifying multiple partners with experience at multiple levels, the Commonwealth has constructed a resiliency resource system with primary and secondary capacity in critical areas. Please see *Table 1.* Virginia's Key Partners and Primary Technical Capacities (p. 13), and Attachment A (p. 51) for further examples of this initiative's deep capacities.

Capacity for Effective Cost-Benefit Analysis. Virginia's DHCD, VDEM, its partner localities in Hampton Roads and its engineering partners all have extensive experience with cost-benefit analysis, including FEMA's Hazard Mitigation Cost Effectiveness process. Reasonable costs for projects will be determined by consulting experienced construction cost estimators, comparing costs of similar work performed or projects accomplished previously or currently in progress, performing a cost-benefit analysis, and consulting RS Means, an established industry reference resource with accurate cost data for materials, labor and construction costs, and the FEMA Equipment listing.

C. COMMUNITY ENGAGEMENT CAPACITY. The Commonwealth is committed to citizen engagement and active involvement in its approach to resiliency. The DHCD and its partners – for example, Norfolk and

Chesapeake's Neighborhood Specialists, Hampton Roads Center for Civic Engagement, ODU, VIMS, Wetlands Watch, Hampton Roads Community Foundation, HRPDC, the UP Center, and Emergency Management staff -- all have long records of engaging stakeholders, including those most vulnerable to future threats associated with climate change (see Attachment D, p. 116). This wide network of engagement capabilities has already been employed to connect stakeholders to the NDRC planning and implementation process. Partners have also expanded the capacity to collect and analyze citizen input through survey research, as demonstrated by an ODU survey of 7,000 regional households, which identified and mapped recovery needs and community vulnerability in Hurricane Irene's aftermath. Norfolk and Chesapeake, the qualifying cities for this initiative bring resources and complementary strengths. As one of the Rockefeller Foundation's 100 Resilient Cities, Norfolk benefits from that initiative's resources on engagement techniques, while Chesapeake employs an especially effective community outreach network that capitalizes on the city's award winning digital technologies.

Citizen outreach and education on the impacts of sea level rise has occurred in Hampton Roads through the Hampton Roads Adaptation Forum on a quarterly basis since 2012. The ODU Mitigation and Adaptation Research Institute, in cooperation with HRPDC and area municipalities, provides a place for a regional dialogue to address concerns, and best practices and plans for dealing with sea level rise and climate change.

Through its administration of HUD and other social service programs, DHCD regularly works with vulnerable populations. Public participation is a requirement of most DHCD-administered programs, whether it is seeking input annually on the Program Design documents used to implement programs, regularly held participatory meetings for the Agency Action Plan (its HUD resource investment strategy), or public meetings for the agency's oversight of locally based projects. From planning through implementation, citizens are encouraged to participate in the process. The DHCD regularly holds participatory public meetings in neighborhood locations including churches, community organizations

and libraries to provide information and encourage citizen involvement. DHCD and its Hampton Roads partners will use these engagement strategies during the Phase II planning and implementation process, in addition to social media, printed flyers, and announcements in local papers.

Additionally, the Cities of Norfolk and Chesapeake ensure input from low income residents through extensive outreach via Neighborhood Specialists who are assigned to all neighborhoods in the city. Specialists work with low- and moderate-income neighborhood through civic leagues and business task forces to ensure that all voices are consulted on city projects. For example, to ensure citizens' vision drove the design of four new schools in low- and moderate-income neighborhoods, Norfolk engaged in a six-month listening process including public meetings, website input, community charrettes and Civic League presentations. Initial and subsequent designs were framed by this citizen input. Chesapeake relies on input from its Natural Event Mitigation Advisory Committee, comprised of equal numbers of city emergency services staff and citizens, business members and nonprofits who guide policy decisions.

All Hampton Roads municipalities also have boards, commissions, and committees created to foster involvement and obtain citizen input on critical matters. Norfolk's 100 Resilient Cities initiative likewise has brought stakeholders together in workshops and committee meetings to seek input on regional threats and potential resilience strategies. Partner cities will use these advisory bodies to advance stakeholder engagement in the selection, planning and implementation of the grant-funded projects.

Empowering Formal and Informal Community Leaders. DHCD empowers formal and informal leaders to create communities that are safe, affordable and prosperous by taking advantage of the unique capabilities of municipalities to build local leadership. The City of Norfolk's Emerging Leaders program targets low- and moderate-income youth ages 16-19 to participate in a paid summer internship program that includes leadership development programming and the opportunity to work with professional city staff on important city projects.

In the City of Chesapeake, an annual Neighborhood Leadership program provides residents with opportunities to learn first-hand about establishing effective civic leagues and creating positive partnerships with City government, non-profits, and private groups.

At the regional level, the HRPDC's Residential Retrofit Project uses neighborhood-level leadership to drive conservation improvement outcomes in low-income areas. Local private nonprofits and faith-based groups assist with participant screening, staging and conservation retrofits installation. This cooperative effort has resulted in greater participation and improved outcomes, including water conservation.

Harmonizing Contributions of Diverse Stakeholders. Together with DHCD and the Governor's office, staff from the cities of Chesapeake and Norfolk have actively reached out to engage a wide variety of stakeholders. DHCD has also partnered with the Hampton Roads Center for Civic Engagement, a nonprofit advocacy group that designs and facilitates civic engagement programs. The input garnered from diverse stakeholders has shaped the direction of this NDRC proposal and helped identify project partners who have agreed to contribute their expertise. The proposal development team has met weekly to integrate both quantitative and qualitative data, as well as the opinions and interests of diverse stakeholders. This approach to planning has produced an approach and strategies that encompass a wide range of interests, in addition to being responsive to community input. Updated plans are shared with stakeholders, providing additional feedback and ensuring the project direction remains congruent with stakeholder needs. Looking ahead to Phase II, the Commonwealth of Virginia envisions a **THRIVE** management team that is truly representative of the diverse interests of Hampton Roads citizens.

D. REGIONAL AND MULTI-GOVERNMENT CAPACITY.

Experience Effectively Addressing Regional Problems. The DHCD works with regional planning bodies and localities in carrying out its mission. The state recognizes that important issues require coordinated efforts, and this primarily occurs through organizations that collectively address regional challenges, such as transportation (Hampton Roads Transportation Planning Organization), water quality

(Hampton Roads Sanitation District), community engagement (Hampton Roads Center for Community Engagement), social service planning (The Planning Council), and sea level rise (the HRPDC's Special Committee on Recurrent Flooding and Sea Level Rise, and the ODU Hampton Roads Sea Level Rise Preparedness and Resilience Intergovernmental Planning Pilot Project). With these groups as partners, and the DHCD's experience with regional planning and coordination, Virginia has a solid foundation and can pilot a truly regional approach to resiliency.

Working Regionally on Resilience. Virginia is committed to supporting the region's move towards resilient solutions to its water management challenges. In fact, the geographical layout of Hampton Roads and its vulnerability to sea level rise and flooding require a regional approach (see HRMap.pdf for a map of Hampton Roads). Sea level rise is already a reality in this region of Virginia, and its localities are working to address these threats with the support of HRPDC and ODU, as well as the Commonwealth's Joint Subcommittee on Recurrent Flooding.

Addressing Disparities through Regional Efforts. Hampton Roads' interconnected nature requires a regional approach, as demonstrated by many local nonprofit agencies which operate on a regional basis. Rising water means that in the near future, Hampton Roads residents will need to live differently, and **THRIVE** will pilot strategies to facilitate safer communities, more vibrant economies and more socially cohesive neighborhoods. Micro-networks, linking residents at the civic league level are already being piloted in Norfolk, Virginia Beach and Newport News, and VDEM is convening informational hearings to better understand the challenges of protecting the region's most vulnerable citizens in a disaster. Another example is an innovative model already addressing disparities through regional efforts: three Hampton Roads cities have each funded and constructed Single Resident Occupancy (SRO) buildings to serve the area's homeless citizens. Available housing space is shared as needed, across city boundaries.

Leveraging Existing Multi-Entity Organization for Project Implementation. Virginia is exploring approaches for managing project implementation; however, this will be driven, to some degree, by the

actual projects selected in Phase II. DHCD recognizes the value of leveraging existing efforts of multi-entity regional organizations and would also seek to integrate new partners, using existing organizations and structures to plan and carry out the work of the grant as appropriate to the plan's strategic goals.

EXHIBIT D: NEED

COMMONWEALTH OF VIRGINIA

ExhibitDNeed.pdf

EXHIBIT D: NEED

Unmet Recovery Needs. Damage from Hurricane Irene was evaluated by an assessment team using FEMA's structural damage levels for homes in the region. Based on analysis of data collected, the Hampton Roads cities of Norfolk and Chesapeake meet CDBG-NDRC thresholds for *Most Impacted* and *Distressed* areas (see Exhibit B, p. 4). Windshield surveys of the areas, conducted in January and March 2015, reveal water-related *Unmet Recovery Needs* from Irene remain for nearly half the damaged homes. Repairs made to these homes did not incorporate resilient measures to mitigate similar future damage. Surveyed homeowners reported they did not undertake resilient repairs such as elevating the structure because of inadequate funding. Other Virginia localities, including Accomack County and the Cities of Newport News and Portsmouth, are compiling data to meet CBDG-NDRC threshold requirements and will be included in Phase II if possible.

Hurricane Irene again exposed the region's vulnerability to storm and flooding, which is increasingly intensified by the impact of sea level rise. Research by Atkinson, Ezer and Smith (2012), entitled "Sea Level Rise and Flooding Risk in Virginia," reports the Hampton Roads region is experiencing the highest rate of relative sea level rise on the East Coast due to the exacerbating effects of land subsidence. In Hampton Roads, sea level has risen over 14 inches since 1930 (see SLRinHR.pdf, sea level rise in Hampton Roads), in contrast to a global sea level rise of 5-8 inches over the last century. When coastal areas experience hurricanes, there is an accompanying storm surge, a deadly combination of strong wind and waves, rainfall, and atmospheric pressure, that drives water onto the shore. In a Category III hurricane, much of the Hampton Roads region would be underwater (see HRSurgeMap.pdf, map showing storm surge). Hampton Roads is second only to New Orleans as the largest population center at risk from rising water and ranks tenth in the world in the value of assets exposed to flooding. These assets include Naval Station Norfolk, the largest military base in the world, and numerous other important military facilities (see HRMilFac.pdf, regional map of military and federal facilities). The military is vital to

Hampton Roads' current economy, as almost a quarter of the nation's active-duty military personnel are stationed in the region. Other important regional economic drivers include US naval shipbuilding and repair capacity, and the Port of Virginia, the only East Coast port with shipping channels deep enough to accommodate the massive Post Panamax ships.

The extent of the potential threat in Hampton Roads makes clear that the unmet need is not only for resources to repair the water damage to homes in areas designated *Most Impacted* and *Distressed*, but also for resources to develop an innovative multi-pronged approach to resilience that will enable Hampton Roads to protect the homes of residents by anticipating, preparing for and adapting to the changing environment. The **THRIVE** vision for Hampton Roads involves a series of infrastructure (including the complex network of energy, transportation, communications and water systems that make modern urban life possible), social networking and economic development projects that are designed to showcase innovative opportunities for solutions for managing water and building resilience to flooding in the midst of climate change.

While discussions of existential threats to the region may seem dramatic, it is worth noting that when Hurricane Irene made landfall along the North Carolina coast, it was a Category 1 hurricane. In light of the projected rise in sea levels (an additional 3 feet of sea level rise by 2100), the expected amount of future damage from more intense storms, for instance Category 4 or 5 hurricanes, creates the potential for a Hurricane Katrina-like scenario in Hampton Roads. This forward-looking risk analysis drives regional thinking to more comprehensive approaches to building regional resilience.

Most Impacted and Distressed: The City of Chesapeake. Established in 1963, Chesapeake is a relatively young mix of suburban and rural communities. Geographically, the tidal Elizabeth River flows through its center, and the Great Dismal Swamp borders it to the west. Early on, the city took measures to check building in its flood plain and wetlands through building ordinances. Many of Chesapeake's neighborhoods experience repetitive flooding (see MID-URNTarget_Ches.pdf, map of Chesapeake); one

example is Mains Creek, a lower-to-middle income neighborhood with 121 homes located in the 100-year floodplain (see MainsCreek.pdf, map of Mains Creek) Constructed in the 1960's, before Chesapeake developed its local NFIP and minimum standards for construction elevations, its lowest roads are 3-4 feet above sea level, and the lowest homes are 4-5 feet above sea level. Roads constructed today must be 7 feet above sea level. Ninety-one homes in Mains Creek experience repetitive flooding.

Many Mains Creek residents are elderly, with few financial or social resources, and this community's need for a comprehensive, resilient approach to repeated flooding is unmet because of inadequate funding. Resilient solutions currently being explored include: elevating or acquiring houses (which will be demolished to restore the land to green space for perpetuity); improving infrastructure for better water management; increasing road elevation in the target area to eliminate flooding of streets and yards; and installing tidal flood gates to control increased surge waters from the Elizabeth River into Mains Creek.

The City of Norfolk. Founded in 1682, the City of Norfolk is Virginia's second-largest city and home to the world's largest naval base, Naval Station Norfolk. Tidal waters surround it on three sides. Its position on the Chesapeake Bay, combined with low drainage gradients due to near sea-level topography, puts a significant portion of Norfolk at risk for flooding from heavy rains, high tides, and storm events. Areas most prone to flooding are built on the sites of former creeks and inlets filled in decades ago, including areas of the city where public housing is located. As the City of Norfolk target area map demonstrates (see MID-URNTarget_Norfolk.pdf), the Most Impacted and Distressed Target Area encompasses almost the entire city. More than 53% of the city's population is low- or moderate-income. Norfolk is rated the 13th most fiscally stressed locality in Virginia, and considered "High Stress" by the state's Commission on Local Government. Nearly 15% percent of families in Norfolk are living below poverty level, with nearly 40% of all census tracts designated as Medically Underserved Areas. Exhibit B (see p. 4) describes the extent of damage recorded by the city damage assessment team that conducted windshield surveys in the aftermath of Virginia's qualifying event, Hurricane Irene, and again in March 2015.

FUTURE THREATS AND UNMET NEED. This proposal focuses on threats and vulnerabilities associated with managing water; specifically recurrent flooding and sea level rise. In its 2013 Hazard Mitigation Plan, Virginia identified flooding as the top hazard with regards to probability and impact to all jurisdictions in the Commonwealth (see FloodHazardMap.pdf, showing flooding in Virginia).

Risk and Vulnerability Data. In the last decade more than 40 separate science-based studies focusing on current and future water-related risks, vulnerabilities, and solutions were completed by Hampton Roads localities, universities, businesses, private nonprofit organizations, military facilities and the Port of Virginia. This proposal leverages findings of these analyses, including the recent US Army Corps of Engineers' *North Atlantic Coast Comprehensive Study*, along with output from peer-reviewed tools such as the Rockefeller Foundation-supported Climate Central's Surging Seas Risk Finder and NOAA's Digital Coast, among others.

Risks Seriousness and Likelihood. With sea level rise in Hampton Roads region at the highest rate of relative sea level rise on the East Coast, the region is clearly at risk. Furthermore, seven of the ten most significant regional storms since 1933 have occurred during the last thirteen years, indicating the level of risk is accelerating. According to a Virginia Institute of Marine Science (VIMS) study, "Recurrent Flooding Study for Tidewater Virginia," local sea level is projected to rise 1.5-7.5 feet by 2100, and conservative estimates project a 3-foot rise by 2100, so the threat to the region will continue to increase.

Risk to Vulnerable Neighborhoods. Under NOAA's Climate Central intermediate low scenario, there is "a better than even chance" (*Virginia and the Surging Sea*, 2014) of floods exceeding 5 feet above the high tide line by 2030-40 along the whole Virginia coast. Based on Climate Central's Surging Seas risk finder estimates, more than 107,000 Virginians live in homes below 5'. Close to 77,000 of Virginia residents are in the high or medium Social Vulnerability Index class with 17,000 in Norfolk alone. Furthermore, according to US Census data, 9% of Hampton Roads residents report they do not have access to a vehicle. This indicator of vulnerability would impact resident evacuation and use of public

shelters and transportation. An ODU survey of 7,000 regional households, which identified and mapped recovery needs and community vulnerability in Hurricane Irene's aftermath, further demonstrates that large pocket of region's populations are at risk.

Risk to Economic Assets. A study by Sandia National Laboratories notes failure to mitigate the effects of climate change could cost Virginia $45.4 billion in GDP and over 314,000 jobs between 2010 and 2050. In Hampton Roads, economic wellbeing depends on the same surrounding bodies of water that place it at risk; thus, sea level rise will impact nearly every sector of the regional economy. The region is home to the largest concentration of US defense facilities in the world and the third largest commercial port on the east coast. It is also a major hub for shipbuilding and has a strong tourism-related economy. Sea level rise and flooding puts these critical assets to the regional and national economy, as well as global security, at increasing risk.

According to a recent study by the HRPDC, the large number of businesses and employees working in Category 1 (flood) zones indicates that "a significant amount of economic activity will have to shift around the region to cope with sea level rise by the end of the century." Another Wetlands Watch study, "Climate Change in Hampton Roads," estimates that by the end of the 21st century sea level rise could result in direct economic costs between $12 and $87 billion, with up to 877 miles of roads in the region permanently or regularly flooded by 2100 (see Roadways&SLR.pdf, map of major highways susceptible to flooding).

Military Presence and Flood Risk. Hampton Roads hosts major Navy, Air Force, Army, Marine Corps, and Coast Guard facilities, including Naval Station Norfolk, the largest military base in the world, with a plant replacement value of over $4.2 billion. Nearly a quarter of the nation's active-duty military personnel are stationed here, and 31% of US naval shipbuilding and repair capacity is housed in the region. Other area Department of Defense facilities include NATO's Allied Command Transformation, Homeland Security facilities, Jefferson National Accelerator Facility, and NASA Langley Research

Center. In 2013, defense-related activities and spending accounted for 41% of the region's $87 billion economy.

At an average elevation of 8-1' above mean sea level, Naval Station Norfolk and many of the 29 other military bases, shipyards and installations in the region already experience storm-related flooding. Furthermore, military readiness depends on regional infrastructure such as roads, bridges, tunnels and utilities located off base. Studies show that the 1.5' sea-level rise projected by 2032- 2062, combined with a mild 3' storm surge, would impede roadway access to nine of the region's military facilities, including Langley Air Force Base, Naval Station Norfolk, Norfolk Naval Shipyard and Naval Air Station Oceana.

Flood Risk to the Port of Virginia. The Port of Virginia has significant economic value to the Commonwealth. In 2013, 81 million tons of cargo valued at $53 billion moved through the Port of Virginia facilities, and according to an economic impact report by the College of William and Mary, the Port's total economic impact for the Commonwealth of Virginia was $60 billion. Related economic activity employs more than 343,000 Virginias and an additional 10% of gross regional product (35,000 jobs) was generated by Port of Virginia activities.

Sea level rise and flooding place this critical economic engine at risk. The Port of Virginia Master Plan 2040 estimates its facilities can withstand 1 foot of sea level rise. But, like the military, the Port depends on transportation infrastructure.

Risk to Other Economic Drivers. Hampton Roads also is home to Newport News Shipbuilding, sole designer, builder and refueler of US Navy aircraft carriers and a provider to US Navy submarines. With approximately $4 billion in revenues and over 23,000 employees, it is the largest industrial employer in Virginia and the largest shipbuilding company in the US. Finally, tourism is the third largest economic driver in Hampton Roads, which draws to its beaches, Colonial Williamsburg, Busch Gardens, and other attractions that directly and indirectly impact the region financially. Sustaining these important regional and global assets will require adaptation to sea level rise and proactive flood risk management.

Known Unknowns. The long range, end-of-the-century forecasts show significant uncertainty, with regional projections for sea level rise estimated between 1.5 and 7.5'. These projections are based on the US National Climate Assessment, which generated four scenarios of global sea level for its 2013 report to Congress. However, given current projections, a study by VIMS recommends that the regional cities plan for the 1.5' rise expected in the next 20-50 years under a very moderate scenario. This time frame takes into consideration potential sea level rise impact relevant to home mortgages and most public infrastructure systems.

Flood Risk and Insurance Coverage. A CoreLogic Storm Surge Report (2011) demonstrates a large number of Hampton Roads residents are potentially uninsured for storm-surge flooding. Out of approximately 90 seaside communities, Hampton Roads has the highest percentage of homes (86% or about 340,000 homes) that are at risk of storm-surge flooding, but are located outside a FEMA zone where flood insurance is required.

While there is limited regional data explaining flood insurance purchasing decision drivers, a 2006 RAND Corporation study, "The National Flood Insurance Program's Market Penetration Rate," found only approximately 20% of homeowners living in the most flood-prone areas buy federal flood insurance when not required to do so. Additionally, according to the Virginia American Security Project, a reduction in the number of insurers in the region (55% of insurers active in the Mid-Atlantic market will not sell policies for businesses and primary residences in Virginia's coastal region) has adversely impacted pricing, likely causing many consumers, especially low- and moderate-income households, to opt-out of program participation. Furthermore, according to an ODU's 2014 "Life in Hampton Roads Survey," 43% of survey respondents mistakenly believe that having an active homeowner insurance policy covers damage from flooding.

Exacerbating Conditions – Disproportionate Effects. The challenge of water in Hampton Roads is made more difficult by the state of several cities' economic health. For instance, Norfolk is the 13th most

fiscally stressed municipality in Virginia, and rated "High Stress" by the Commonwealth's Commission on Local Government. Nearly 15% of Norfolk families live below the poverty level, more than 50% of its census tracts are designated LMI neighborhoods, and almost 40% of them are designated as medically underserved areas.

Existing Actions Addressing Risks and Barriers. As discussed in Exhibit G, the Commonwealth and Hampton Roads localities have already taken major steps to address the risks from the vulnerabilities discussed above. These include raising standards, aligning governance, engaging the community (see Exhibit C, p. 10) and implementing grey and green infrastructure mitigation projects.

Many Hampton Roads localities have undertaken coastal shore stabilization projects, including the construction of a series of near-shore breakwaters and beach and dune sand replenishment, and environmental restoration activities, including the construction of oyster reefs in the Lafayette River, coastal wetlands, and living shorelines. As a result, wetland restoration more than tripled between 2011 and 2014 alone. Furthermore, the City of Norfolk has refurbished the floodwall originally constructed by the US Army Corps of Engineers which protects the entire downtown, has begun to replace aging stormwater drainage infrastructure and has elevated roadways in areas prone to coastal flooding. Hampton Roads localities have also actively pursued the Hazard Mitigation Grant Program funding to elevate or acquire residential structures in special flood hazard areas. Norfolk has elevated 29 houses and Poquoson elevated about 600 homes or 15% through this program. Hampton Roads localities also participate in the National Flood Insurance Program (NFIP) and FEMA's Community Rating System (CRS), and as discussed in Exhibit G (p. 47), many localities abide by more stringent guidelines than required by NFIP.

While these efforts are important, they constitute an inefficient piecemeal approach to mitigation, and the Commonwealth of Virginia and the Hampton Roads region both lack the resources necessary to implement a comprehensive resilience plan.

EXHIBIT E: SOUNDNESS OF APPROACH

COMMONWEALTH OF VIRGINIA

ExhibitESoundnessOfApproach.pdf

EXHIBIT E: SOUNDNESS OF APPROACH

CONSULTATION. This proposal reflects the input of a wide range of stakeholders including multiple levels of government, human service providers and other nonprofit organizations, private businesses, neighborhood organizations, philanthropic organizations, and concerned individuals. Input mechanisms included 100 Resilient City workshops, work groups and committee meetings, academia-led interactive community discussions, neighborhood-based community meetings, surveys, and one-on-one conversations.

Led by the Office of the Governor of Virginia, Virginia's Chief Resilience Officer, and Virginia's Secretary of Commerce and Trade, and the Commonwealth's designated applicant, DHCD, the strategic development process involved staff from the cities of Chesapeake and Norfolk, including Norfolk's Chief Resilience Officer, all of whom consulted with local stakeholders. Support for this process was provided by ODU and the final vision was vetted by partner organizations. The draft proposal was published on DHCD's website providing opportunities for public comment. In addition, a public hearing was held in the Hampton Roads region during which participants were invited to provide feedback on the proposal draft (see Attachment D, p. 116).

The Commonwealth's threats, vulnerabilities and hazards have been identified by engaging stakeholders around research-based information via individual and group consultations, as well as in working group sessions and regional hazard mitigation planning processes. Input also has been garnered through regional planning, education, and outreach events such as: a FEMA National Exercise Division tabletop exercise with over 200 participants; regular Hampton Roads *Sea Level Rise and Flooding Adaptation Forums* organized by ODU and HRPDC; an Urban Land Institute *Resilience Panel,* which conducted interviews with nearly 100 stakeholders; a *100 Resilient Cities* workshop with over 100 stakeholders; the HRCF's *Reinvent Hampton Roads* initiative; and, a new regional conference, *"TechSurge - Technical Support for Coastal Resiliency,"* with over 250 planners from all levels of

government and industry; and many additional community outreach and education activities. As **THRIVE: Resilience In Virginia** moves to Phase II, DHCD will coordinate a wide network of engagement capacity to bring together work groups and to distribute information, ensuring that all stakeholders, most importantly vulnerable populations, are represented and informed about the process.

The uniting issue for Hampton Roads is how to thrive as a model maritime community among rising seas, while facing uncertainty about the future of federal spending in the region, and combating the effects of concentrations of poverty. Stakeholders, especially vulnerable stakeholders, agree that these are interconnected challenges and conditions and have a cumulative negative impact on our communities. Therefore, viable solutions must include strategies to mitigate all three simultaneously.

IDEAS AND APPROACH. Input from stakeholders and partners has helped create a comprehensive approach that builds on strengths and converts risks and vulnerabilities into opportunities: ***Hampton Roads will thrive with water by developing a model maritime region that derives its economic vitality from its position on the water.*** Specifically, Virginia's strategy is to create long-lasting resilience in Hampton Roads at all scales, by uniting the region around shared water challenges, by improving economic vitality and strengthening vulnerable neighborhoods, and by building social cohesion around water management solutions. Proven strategies from this regional pilot will be replicated across Virginia to build resilient communities over a range of environments, including communities with riverine flooding, periodic drought impacting agricultural production, and concentrations of poverty and communities with low social cohesion.

This proposal is key to jump-starting the Hampton Roads regional transformation to a model maritime region equipped to handle rising waters. In turn, Virginia will use the region's experiences to surface, test and refine the best strategies; however, DHCD and Virginia's qualifying localities will continue to seek additional funding opportunities to strengthen the approach.

As one of the first coastal regions to experience daily impacts of rising water, Hampton Roads has a head start on planning for mitigation and adaptation. The region's strategy leverages key knowledge, aligning it to a resilience framework to inform planning, investment and implementation strategies for thriving with water. Guided by the National Preparedness System, **THRIVE** features an approach with five lines of effort, each designed to achieve a major critical objective, address unmet need, and provide replicable and scalable solutions to identified vulnerabilities (see Figure 1, below).

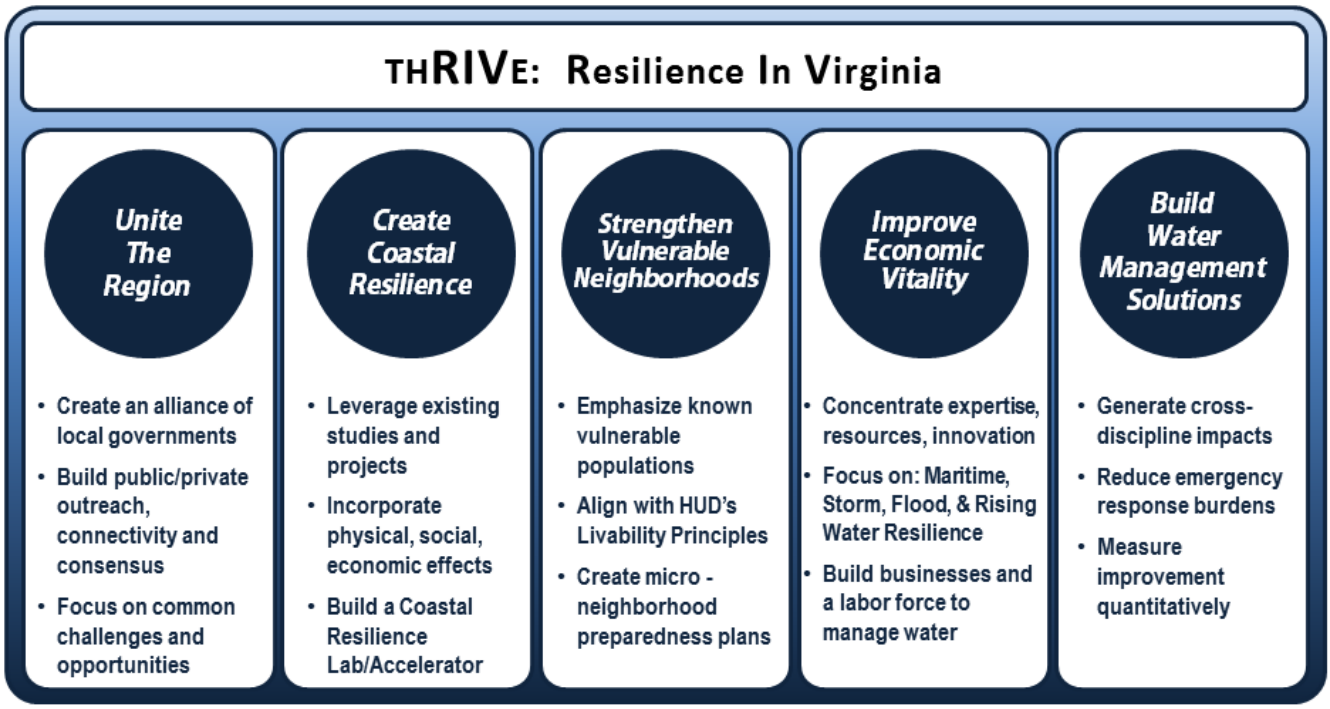

Figure 1. **Virginia's approach**

Unite the Region*:* This approach helps unite efforts among the region's cities, businesses and residents; all bound by a shared deep-water harbor, and common environmental challenges and economic opportunities. Virginia is already working to unite the region around economic development and entrepreneurship opportunities. Creating an alliance of local governments will focus these efforts on water-based opportunities will support a regional solution to Hampton Roads' challenges of sea level rise and flooding. HUD NRDC grant funding will help the cities of Hampton Roads to focus on their common challenges and pilot strategies that can be applied elsewhere in the Commonwealth.

Create Coastal Resilience: Virginia will leverage water management projects to create a model for resilience, and a methodology and planning tool to increase the region's physical, social, and economic resilience. **THRIVE: Resilience In Virginia** builds on three sets of standards/ value systems: the National Preparedness System, Six Livability Principles and the 100 Resilient Cities resilience framework.

The National Preparedness System's six-part structure addresses preparedness: *Identifying and assessing risk; Estimating capability requirements; Building and sustaining capabilities; Planning to deliver capabilities; Validating capabilities; and Reviewing and updating*. The **THRIVE** model will contribute to resilience with guidance from the Six Livability Principles adopted by HUD to facilitate interagency coordination: *Provide more transportation choices, Promote equitable, affordable housing; Enhance economic competitiveness; Support existing communities; Coordinate policies and leverage investment; and Value communities and neighborhoods*. Finally, the model will also be driven by the 100 Resilient Cities resilience framework, which ensures investments produce co-benefits that increase the region's ability to survive, adapt and thrive in the face of hazards (see Outcomes in Exhibit F, p. 41).

Strengthen Vulnerable Neighborhoods*:* Research conducted in the aftermath of Hurricane Sandy reveals that cohesive communities bounce back from disruptive events more quickly. In Hampton Roads, the increased frequency and intensity of storms, along with flooding, increases the risk to vulnerable populations. Many of these individuals live independently in their own homes, but rely on daily support services, as revealed in a regional survey in the aftermath of the Qualified Disaster, hurricane Irene: over 13% of the 7,027 surveyed households have at least one adult (18+ years age) dependent on others for help with normal daily activities. When extreme events disrupt transportation, energy and other basic service networks, this vulnerable population's survival is at risk.

In addition to increasing job opportunities and providing safer housing, this initiative will strengthen vulnerable residents' resilience by fostering neighborhood cohesion. The region has begun to pilot hyper-local networks designed to increase the ability of vulnerable residents to survive in place for short periods

when essential support services are disrupted. Developing small networks of neighbors and connecting them through technology that provides hyper-local information on conditions, transportation routes, shelter, food, water, and power availability, will provide needed care for populations at risk for survival during disruptive events.

Research also suggests that financially vulnerable residents are less likely to evacuate in the face of a severe storm because they lack the financial resources to leave their homes for overnight stays. Using neighborhood networks to identify those residents who are at risk for survival due to disruptions but financially unable to relocate, even for short periods of time, the initiative will explore ways to provide short-term assistance, enabling residents to leave prior to the arrival of severe weather. In piloting this funding to vulnerable residents, the Commonwealth can test this strategy for helping vulnerable people to temporarily leave their neighborhoods when evacuation is advised.

To further strengthen neighborhood resilience, **THRIVE** will expand existing efforts to educate residents and business owners about current threats and adaptive strategies to reduce risks. Regional efforts are already underway to find innovative approaches to distributing critical information in ways that drive behavior adaptation. A committee of business, government, and resident representatives is developing public information campaigns around reducing resident and business vulnerabilities to flooding. Recommendations include color-coding frequent flooding areas, finding new ways to calculate the benefits of flood insurance, and integrating flood risk reduction strategies into K-12 education as a way of informing parents about the importance of taking action.

Build Water Management Solutions*:* Under the leadership of DHCD, the **THRIVE** initiative will imagine, create, and build water management solutions that address current gaps in the region's capabilities, showcasing innovative multi-scale solutions, systems, and technologies useful to other communities. Hampton Roads is already a natural lab for state-of-the-art water management practices.

The Rockefeller Foundation-supported Structures of Coastal Resilience (SCR) design study and RE.invest Initiative ideas, the US Army Corps of Engineers' North Atlantic Coast Comprehensive study, the Urban Land Institute's Resilience Technical Panel recommendations and the Dutch Dialogue recommendations for the region all offer innovative approaches for living with water and building resilience that can be tested in Hampton Roads. For example, Re.invest recommends the use of innovative structures to both hold and filter rain water. These structures provide enhanced, natural environments that soften the urban hardscape. The cross-disciplinary approach to planning will help generate ideas that provide a basis for viable project designs in Phase II.

Improve Economic Vitality*:* In the coming decades, the Hampton Roads region will invest heavily in water management and water mitigation systems. The need to operate the Port of Virginia, Naval Station Norfolk and other businesses that rely on proximity to the water presents the region with the opportunity to create solutions that ensure ongoing operation of these globally important assets. Using this grant, **THRIVE: Resilience In Virginia** will employ an innovation laboratory/business accelerator model to convert innovative research into marketable products building local businesses and capturing the economic benefit of our own spending. This business cluster, focused on solving the problems associated with living and working on the coast in a rising sea environment, will spur innovation and entrepreneurship, providing workforce opportunities across the region. The resulting job opportunities, created through business growth, will decrease the vulnerability of low-to-middle income residents by increasing both financial security and greater choices for housing. . Regional workforce development programs will create pathways for low- and moderate-income residents to develop requisite skills to fill jobs creates in the new cluster. Building upon the successful and funded efforts already underway in the region, green energy training programs will prepare veterans, unemployed persons and small businesses for the green jobs of the future.

EXHIBIT F: LEVERAGE

COMMONWEALTH OF VIRGINIA

ExhibitFLeverage.pdf

EXHIBIT F: LEVERAGE.

OUTCOMES. A major goal of the Commonwealth's proposed **THRIVE: Resilience In Virginia** approach is to transform how Virginians live with water. DHCD and its partners will develop a model for redesign in coastal communities, concentrating on Hampton Roads' most vulnerable citizens and neighborhoods, where this approach can integrate new water management principles, and mixed-use and mixed-income development practices. These new practices will accelerate the creation of businesses that enhance the Hampton Roads region's ability to manage water and improve water quality, while providing new employment opportunities that will decrease the vulnerability of low-to-mid level income residents.

The **THRIVE** strategy will be carried out in three phases. In the near term, the strategy will focus on incorporating resilient water management strategies into ongoing projects, revisiting redevelopment plans and applying a resilience lens to them, selecting demonstration projects, conducting community outreach, educational initiatives, and advocacy for recommended policies and funding. This will also include replication and scaling of a neighbor-to-neighbor community-building pilot around disaster preparedness that is currently underway. In the mid-term, **THRIVE** pilot/demonstration projects will be implemented, while continuing all of the above. In the long term, DCHD will look for opportunities to scale and replicate successful projects across Virginia while sustaining them in Hampton Roads.

A main criterion for selecting projects to implement as part of this initiative will be the project's potential to deliver co-benefits. As discussed in Exhibit E, Virginia's infrastructure solutions include developing green and nature-based infrastructure that provides recreational amenities, environmental benefits and storm water management, as well as co-benefits such as increased social cohesion and economic development. Specifically, by expanding the region's natural infrastructure (wetlands, shorelines, tree canopy, tidal streams and other landscape features) and building on restoration projects currently underway, a line of defense against storms will be provided, while also providing habitat and water quality improvements.

By increasing community resilience at the neighborhood level through job opportunities, social cohesion and emergency planning network development, communities may over time reap additional resilience dividends. The neighbor-to-neighbor approach around shared water vulnerabilities may serve as an initial step for advancing resident-led vision for revitalization of neighborhoods (re-norming and spill-over). Research shows that increased social cohesion translates into less crime and economic revitalization. Norfolk has successfully piloted such an asset-building model of redevelopment in the Park Place neighborhood.

Environmentally and Financially Sustainable Implementation. The Hampton Roads region has been at the forefront of water quality improvements through the restoration of oyster reefs, wetlands and underwater grasses, and this type of innovation will be incorporated in **Resilience In Virginia** projects. The City of Norfolk is already experimenting with improving water quality in storage systems using natural filtration, and the Rockefeller Foundation's RE.invest Initiative program has provided other water management strategies with the potential to improve water quality, including holding water in tree trenches, bio swales, rain gardens and other landscaping techniques. The RE.invest Initiative also recommended that the region become a lab for water management demonstration projects to attract water management business to the region. **Resilience In Virginia**'s approach will integrate locally and regionally appropriate new urbanism and smart growth development principles, while generating new business in an innovative model maritime community.

Indicators of Success and Evaluation.

Unite the Region: Examples of outcomes that encompass a unified, regional vision for resilience include: an increased number of projects completed collectively by regional partners; an increased number of projects co-funded by multiple regional municipalities; and increased collaboration between the private and public sectors to create solutions.

Create Coastal Resilience: Anticipated outcomes include: integration of systems to manage water, number of cross-disciplinary impacts/co-benefits, such as increased quality of life through open space amenities, water quality, increased economic diversity, increased ability of individuals to meet their basic needs through improved employment opportunities; and creation of more cohesive communities.

Strengthen Vulnerable Neighborhoods: Outcomes that indicate success include: de-concentration of poverty in the targeted area; increased social cohesion as measured by the number of networks in place in the project area; increased housing values in project area; and a reduction in the number of emergency assistance service calls in the targeted project area.

Build Water Management Solution*s:* Desirable outcomes include: increased capacity to manage water as measured by fewer days of flooding and lower levels of flooding in targeted project areas; a decrease in property loss and insurance claims in targeted project areas; and the increased integration of green, grey and hard infrastructure in water management solutions.

Improve Economic Vitality: Examples of anticipated outcomes include: an increased number of small and medium-sized businesses; increased employment opportunities in water management; an increased number of entry-level positions; and increased workforce training certifications for retrofitting property.

LEVERAGE. Innovative projects addressing water management are already underway across the region. Many **THRIVE** partners already work together to increase water quality, reduce risk of water inundation and improve systems handling the precipitation that causes much of the region's flooding. Other examples of supportive projects include dune restoration funded by the US Army Corps of Engineers and the City of Norfolk, and Environmental Protection Agency-funded wetlands restoration in Norfolk's Mason Creek.

The Virginia Port Authority and US Army Corps of Engineers' Norfolk District are in the process of implementing a 10-year, $70 million, 411-acre environmental mitigation plan which allows wetland creation and oyster restoration along the Lafayette and Elizabeth Rivers. Additionally, Concursive Corporation is working with multiple cities and partners to develop strategies to increase the number of

neighborhood networks that improve vulnerable residents' ability to survive service disruptions. The Hampton Roads Community Foundation is implementing regional strategies to increase business start-ups in the region. These efforts all will enhance the implementation and maintenance of grant strategies.

Initiative partners assisted by the 100 Resilient Cities staff are in conversations with insurance and reinsurance representatives around the risks associated with increased flooding and its effects on insurance premiums. Swiss-Re, one of the leading reinsurers and 100 Resilient Cities' Platform Partners, is helping to develop methods to monetize potential insurance savings to fund mitigation efforts that reduce risk. DHCD will coordinate the implementation of strategies to monetize savings developed through this process and apply it to fund projects and related maintenance.

Co-benefits of implementing the strategy include reduced vulnerability resulting from the creation of job ladders leading out of poverty and towards the availability of safer housing choices. Additionally, it could potentially deliver cost savings that which could be contributed toward its financing. By growing businesses to implement mitigation projects, the grant's economic impact will be used to accelerate the pace of building a regional business cluster focused on water resilience innovation and entrepreneurship and developing workforce readiness with our educational partners.

The localities also plan to explore any mechanisms that could be used to reduce the financial burden of flood insurance through the changes of the FEMA flood maps and localities' Community Rating System's (CRS) class. According to the Multi-hazard Mitigation Council, each dollar spent on mitigation saves society an average of four dollars in disaster response and recovery costs. In Hampton Roads, over $17.4 billion in property value is located less than 5 feet above the high tide line in Virginia. According to low range projections, this area has "a more than even chance" of floods exceeding today's historic records within the next 20 to 30 years, according to the *Central Coastal Vulnerability Assessment for Virginia*.

Committed Resources. A total of $275,000 is available for activities directly related to undertaking this CDBG-NDR proposal for **THRIVE: Resilience In Virginia**:

- The Commonwealth of Virginia has committed $200,000 towards project implementation.
- The City of Norfolk has committed $125,000 towards project implementation.
- Old Dominion University has committed $50,000 towards project implementation.

(see Attachment B, p. 108).

EXHIBIT G: LONG-TERM COMMITTMENT

COMMONWEALTH OF VIRGINIA

ExhibitGLong-termCommitment.pdf

EXHIBIT G: LONG-TERM COMMITMENT

The Commonwealth of Virginia, the Hampton Roads region and its individual localities have already taken major steps to improve permanent resilience far beyond its most impacted and distressed target areas. These include resilient legislative actions, raising standards, plan updates and alignments, and resilient actions related to financing.

Legislative and Administrative Action. In July 2014, Governor Terry McAuliffe signed Executive Order 19, convening a Climate Change and Resilience Update Commission "to prepare Virginia's coastal communities to deal with the growing threat of climate change." The Commission builds on the Virginia Governor's Climate Change Commission, which laid out a detailed adaptation plan for the state in 2008. An example of implemented action includes the passage of the Coastal Resource Management Law of 2011 by the Virginia legislature, which requires localities to include coastal management strategies – including sea level rise projections and scientific evidence – in long range land use plans starting in 2013.

Additionally, in response to recommendations by Virginia's Subcommittee on Recurrent Flooding, Virginia was the first state to name a Chief Resilience Officer. In December 2014 Governor McAuliffe created the position of State Chief Resilience Officer to coordinate resilience actions at the state level.

Finally, in July 2014, the Commonwealth instituted new stormwater regulations which significantly increase the number of Low Impact Development (LID), Best Management Practices (BMP) required to meet water quality requirements. Virginia's revised water quality criteria of 0.41 pounds per acre per year of phosphorus protects local water quality and achieves no net increase in nutrients for new development.

Higher Standards at the Local Level. As a result of regulatory changes that give a preference to wetland restoration to mitigate coastal erosion, and federal water quality requirements that improved the cost effectiveness of the wetland restoration strategy, mitigation activities have increased dramatically in Hampton Roads. In Norfolk alone, wetland areas increased from 3,124 square feet to 60,846 square feet between FY2008 and FY2011. Following Hurricane Irene, wetlands more than tripled to 217,070 square

feet by FY2014 as a result of dedicated restoration efforts, reducing vulnerability of the Lafayette River watershed, Norfolk's largest, which includes 26,624 parcels on 8,787 acres of land and approximately 81,000 residents. At the local level, many Hampton Roads cities have significantly raised standards in their floodplain ordinances in response to increasing threats. Effective January 2014, Norfolk mandated 3 feet of freeboard for structures in the 100-year floodplain and a 1.5 foot freeboard for structures in the 500-year flood zone compared to the previous 1 foot requirement. Hampton similarly increased freeboard requirement to 3 feet in September 2014, while Virginia Beach requires 2 feet freeboard. In July 2013, The City of Chesapeake increased its freeboard from 1 foot to 1.5 feet. These changes will increase permanent resilience by reducing risk to all new and future structures built in flood-prone areas. Should Sandy-like storm hit the region, more than 56,000 structures in the floodplain would have to be rebuilt at these standards in Norfolk alone if they were destroyed or sustained substantial damage.

Resilience Actions Related to Plan Updates or Alignment. As part of its long-term commitment to enhancing resilience, the Commonwealth of Virginia commissioned three formal reviews of climate change and its impacts. The three plans build on each other and include the 2008 Climate Action Plan, the 2013 Virginia Institute of Marine Science study on *Recurrent Flooding in Tidewater Virginia* and the September 2014 action plan by the Recurrent Flooding Sub-Panel of the Virginia General Assembly Secure Commonwealth Panel.

Several Hampton Roads cities are in the process of creating or have already developed watershed management plans. For example, beginning in 2007, the City of Norfolk conducted a series of watershed specific coastal and precipitation flooding studies to better understand where and why flooding was increasing in the city. The studies led to the development in 2014 of a Comprehensive Flooding Strategy and a Combined Coastal & Precipitation Flooding Master Plan for the City. Since 2014, as part of the City's participation in the 100 Resilient Cities network, Norfolk has been developing a comprehensive resilience strategy for the city, including a long-term recovery plan which integrates

lessons learned from previous events including Hurricane Irene and Hurricane Sandy as well as best practices from around the world. Norfolk is presently rewriting the zoning code ordinance which will be guided by a resilience framework being developed in cooperation with 100 Resilient Cities, the American Planning Association, the Urban Land Institute and others.

Resilient Actions Related to Financing. Hampton Roads localities have begun to explore new financing mechanisms dedicated to addressing identified risk and vulnerabilities. For example, in 2012 Norfolk increased its Storm Water Fund by $1 per month per account, raising nearly $1.3 million annually.

Conclusion. Virginia is committed to continued action that will increase resilience and mitigate the impact of sea level rise in the Hampton Roads region, especially in its most impacted and distressed target areas (see Exhibit B, p. 4) within one year of the announcement of Phase II results. This proposal for **THRIVE: Resilience In Virginia** represents a shift to a comprehensive, well-coordinated regional approach that will coordinate all of Hampton Roads' resilience efforts – not simply the projects that would be funded through a HUD NDRC award.